BEST AVAILABLE IMAGES

Defective images within this document are accurate representation of The original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B65D 8/22, 8/08 — A1

(11) International Publication Number: WO 95/30585

(43) International Publication Date: 16 November 1995 (16.11.95)

(21) International Application Number: PCT/GB95/00890

(22) International Filing Date: 20 April 1995 (20.04.95)

(30) Priority Data:
9409322.6 10 May 1994 (10.05.94) GB

(71) Applicant *(for all designated States except US)*: KEG SERVICES LIMITED [GB/GB]; Twyford Road, Rotherwas Industrial Estate, Hereford HR2 6JR (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: WHEATON, Christopher, Simon, Courtenay [GB/GB]; 22 Scotch Firs, Fownhope, Hereford HR1 4NW (GB).

(74) Agents: MOSEY, Stephen, George et al.; Marks & Clerk, Alpha Tower, Suffolk Street Queensway, Birmingham B1 1TT (GB).

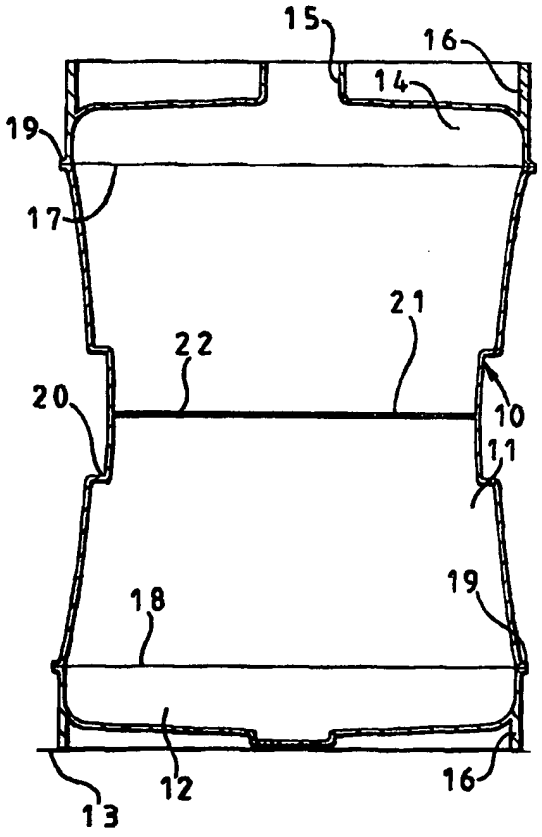
(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.

(54) Title: CONTAINER FOR PRESSURIZED FLUIDS

(57) Abstract

A keg (10) for a pressurized fluid is formed of a main body part (11), to respective open ends of which are secured upper and lower ends parts (14, 12), each of the three parts being an injection moulding of thermoplastics material and connected together by welding. Around an internal surface of the main body part (11) is an integral continuous planar flange (21) which serves to resits outwards pressure on the body when the keg is pressurized, in use, the flange defining a large central opening (22) in the interior of the keg. Ribs (25) are formed integrally with the internal body surface and flange, and extend around the flange between respective pairs of first openings (23) through the flange, smaller second openings (24) being aligned with, and disposed at the inner end of the respective ribs.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CS	Czechoslovakia
CZ	Czech Republic
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgystan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakhstan
LI	Liechtenstein
LK	Sri Lanka
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SI	Slovenia
SK	Slovakia
SN	Senegal
TD	Chad
TG	Togo
TJ	Tajikistan
TT	Trinidad and Tobago
UA	Ukraine
US	United States of America
UZ	Uzbekistan
VN	Viet Nam

CONTAINER FOR PRESSURIZED FLUIDS

This invention relates to a container for pressurised fluid, particularly alcoholic beverages such as beer.

Presently beer kegs are formed of stainless steel or are of thermoplastics material, being produced by blow-moulding. Although easier and less expensive to produce than a stainless steel keg, a blow-moulded keg of thermoplastics material may have only a low working pressure and may be susceptible to a volume increase under pressurisation.

An object of the invention is to provide an improved container for pressurised fluid.

According to a first aspect of the invention, a container for pressurised fluid has a substantially closed, hollow body of thermoplastics material and on an internal surface of the body at least one inwardly extending member which resists outwards pressure on the body when said container is pressurised, in use.

According to a second aspect of the invention, a container for pressurised fluid has a substantially closed, hollow body formed of at least two parts secured together, each part being an injection moulding of thermoplastics material.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a pressurised fluid container of the invention,

Figure 2 is a vertical sectional view through the container,

Figure 3 shows one form of diaphragm of the container,

Figure 4 shows the same form of diaphragm as in Figure 3, but for a square container, and

Figure 5 is an enlarged section on line A-A of Figure 4.

Figures 1 and 2 show a container for pressurised fluid which in the particular application to which the invention is directed, is in the form of a keg 10 for receiving pressurised alcoholic beverages, such as beer.

In the embodiment illustrated in Figures 1 and 2, the keg is generally circular in cross-section, and is made up of a central, main part 11, which is open at its opposite ends, a closed lower end part 12, which, as shown in Figure 2, forms a bottom of the keg which rests on a surface 13, and an upper end part 14 which has a central circular opening 15 which can be closed by a bung or the like as required. It can be seen that both end parts have an integral outer cylindrical enclosure 16 therearound, the end of each of which extends to terminate flush with or slightly beyond the outermost extent of the centre of the end part, so that by means of the cylindrical enclosures, the keg can be stood upright on the surface 13 either as shown in Figure 2 or turned the other way up.

The main part 11, and each of the end parts 12, 14, are, in this embodiment, injection mouldings of thermoplastics material, the parts being joined together as described and shown in Figure 2, by welding at weld lines 17, 18 respectively. Thus the keg is formed as a substantially

closed, hollow body, with liquid passing into and out of the interior of the keg by way of the opening 15. As shown in Figure 2, means for manipulating the keg are shown at the outside of the keg body at the weld lines 17 and 18, these means being denoted by the numeral 19. Moreover mid-way between its ends, the central, main part 11 of the keg body is formed with an indent 20 which extends continuously therearound to enable the keg to be used in palletless handling systems. Instead of being continuous, a number of separate, spaced indents could be provided.

Preferably the host thermoplastics material used to manufacture the keg would be a polypropylene, with this possibly being either a homo-polymer or a co-polymer. The overall mechanical properties of the keg would preferably be achieved by the thermoplastics material being glass-reinforced, with additional glass-reinforcing in critical areas.

The central, main part 11, is symmetrical about its central longitudinal axis, and it is also symmetrical about a central plane at right angles thereto. At this central plane, there is integrally formed on the interior surface of the part 11 a planar diaphragm or flange 21 which is schematically shown in Figure 2.

This central flange is one form of a member disposed on the interior surface of the body of the keg which extends inwardly therefrom to resist outwards pressure on the body when, in use, the keg is pressurised. The member or members resisting such pressure can take many various forms, but the provision of a continuous form of the member around the interior surface of the central, main part of the keg is particularly advantageous, this member being at 90° to the longitudinal axis of the

keg. Generally the diaphragm or flange needs to be more than just a rim because it has to resist the hoop stress which is trying to burst the container, when it is pressurised in use. To provide the necessary resistance to liquid pressure, the flange would normally be rigid or substantially so.

Figure 3 shows one example of a possible form of diaphragm or flange for a cylindrical container, such as that shown in Figure 2. It can be seen that there is a large central opening 22, through which, in use, an extractor tube would pass. It can be seen that the annular flange is provided with a first ring of spaced, identically sized circular openings 23 adjacent the junction between the flange and the main body part 11, and a concentric but inwardly spaced second ring of spaced identically sized smaller diameter circular openings 24, the openings 24 being disposed slightly radially inwardly from the free periphery of the flange. Figure 4 shows the same form of flange, but for a rectangular keg, where the junctions between the four sides are rounded.

With both the Figure 3 and the Figure 4 example, it can be seen that at the integral connection between the flange and the keg body there is provided a ring of stiffening ribs 25, each rib extending from the flange to respective opposite sides thereof. As can be seen from Figure 5, each stiffening rib is of generally triangular shape thus providing a sloping edge 26 from the interior wall of the keg to the flange 21. As can be seen from Figures 3 and 4, each rib is disposed between a pair of the openings 23, and in the particular configuration shown in Figures 3 and 4, the openings 24 are offset relative to the openings 23, so that an opening 24 is disposed centrally in the plane of each rib 25. The flange thus acts as a platform from which the stiffening ribs emanate into the

side wall of the main part 11 of the keg, thereby extending the stiffening effect of this central flange away from its immediate position. Preferably the diaphragm/flange and associated stiffening ribs are moulded in the same process as the main part 11 and thus all these parts are formed of the same thermoplastics material. However the flange and/or the stiffening ribs could be subject to local reinforcement, such as glass reinforcing in critical areas. Ribs could be provided without the provision of openings in the flange, or vice versa.

It is considered that one aspect of the invention relates to the formation of the keg by the use of at least two parts secured together, each part being an injection moulding of the thermoplastics material. It is considered that another aspect of the invention relates to the provision on the interior of a hollow body of thermoplastics material of at least one inwardly extending member which, when the container is pressurised in use, resists outwards pressure on the body. Thus in the first aspect the provision of the flange or the like is inessential, whilst in the second aspect the body may or may not be formed in at least two separate parts and may or may not be formed by injection moulding. However the preferred form of container is that shown in the drawings where at least two injection moulded parts are secured together to form the container with their being a member in the interior to resist any tendency for the container to burst when pressurised. Such a container of this form will perform the same function as a stainless steel beer keg even though it is of (injection moulded) thermoplastics material.

Unlike blow-moulded containers, such a keg will have a working pressure in excess of approximately three bars and will not show any significant increase in volume when pressurised to that level. The ability

of the container to withstand high internal pressure is enhanced by the use of the central perforated diaphragm/flange.

The openings 23 and 24 around the inner and outer peripheries of the flange enable liquid to flow past the flange when the container is laid on its side, as would be the case in dispensing cask conditioned ale (Real ale). It will however be appreciated that the number, size and arrangement of openings in the flange, as well as the number, position and shape of the stiffening ribs can be different from what is shown in Figures 3 and 4. Additionally the flange need not be continuous around the interior surface of either the part 11 or the parts 12 and 14, and even if provided as a continuous flange, more than one flange could be provided in one or more of the component parts of the keg body. The resistance to outwards pressure on the body could be in the form of one or more diametral or generally diametral struts extending between respective opposite internal surface portions of the body, but, with a plurality of struts, sufficient open area defined between them to allow flow of liquid. For example two such struts at 90° to one another could meet at a central circular area, which could have openings therethrough to allow flow of liquid through said area.

CLAIMS

1. A container for pressurized fluid having a substantially closed, hollow body (11, 12, 14) of thermoplastics material and on an internal surface of the body at least one inwardly extending member (21) which resists outwards pressure on the body when the container is pressurised, in use.

2. A container as claimed in Claim 1, wherein the inwardly extending member (21) connects respective opposite or generally opposite internal wall portions of the body.

3. A container as claimed in Claim 1 or Claim 2, wherein a multiplicity of openings (23, 24) for fluid flow extend through said inwardly extending member.

4. A container as claimed in Claim 1, wherein the inwardly extending member extends continuously around the internal surface of the body.

5. A container as claimed in Claim 4, wherein the inwardly extending member is in the form of a flange (21) defining a large central opening (22) in the interior of the body.

6. A container as claimed in Claim 5, wherein the flange (21) is provided with a multiplicity of openings (23, 24) for fluid flow.

7. A container as claimed in any one of the preceding claims, wherein at least one rib (25) is provided at the junction of the inwardly extending member and said internal surface of the body.

8. A container as claimed in Claim 5, wherein a multiplicity of ribs (25) are provided around the flange at its junction with the internal surface of the body.

9. A container as claimed in Claim 8, wherein the flange is provided with a multiplicity of openings (23) for fluid flow, the ribs (25) being disposed between adjacent pairs of said openings (23) respectively.

10. A container as claimed in Claim 9, wherein the flange is provided with a multiplicity of further openings (24) for fluid flow, said further openings being aligned with the ribs (25) respectively in the inwards direction of the body.

11. A container as claimed in any one of Claims 5, 6 and 8 to 10, wherein the flange (21) is normal to a central rotational axis of the body.

12. A container as claimed in any one of Claims 5, 6 and 8 to 11, wherein the flange (21) is formed integrally with said internal surface of the body.

13. A container as claimed in Claim 11, wherein the flange (21) is formed integrally with a central main part (11) of the body and lies in a plane normal to a longitudinal axis of the container, about which plane the main body part is symmetrical.

14. A container as claimed in Claim 13, wherein the exterior of the main body part (11) has indent means (20) extending to opposite sides of said plane.

15. A container as claimed in any one of the preceding claims, comprising a main body part (11) to opposite ends of which are secured respective upper and lower end parts (14, 12), each part being an injection moulding of thermoplastics material.

16. A container as claimed in Claim 15, wherein the parts are secured together by welding (17, 18).

17. A container for pressurized fluid having a substantially closed hollow body formed of at least two parts (11, 12, 14) secured together, each part being an injection moulding of thermoplastics material.

18. A container as claimed in Claim 17, wherein the body is formed of a central, main part (11), to respective opposite ends of which respective upper and lower end parts (14, 12) are secured.

19. A container as claimed in Claim 18, wherein each of the end parts (14, 12) are secured to the main body part (11) by welding.

20. A container as claimed in any one of Claims 17 to 19, wherein the thermoplastics material is glass-reinforced.

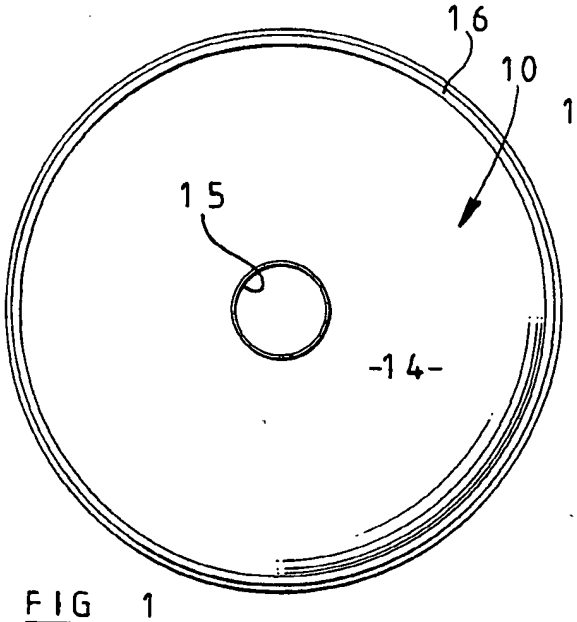


FIG 1

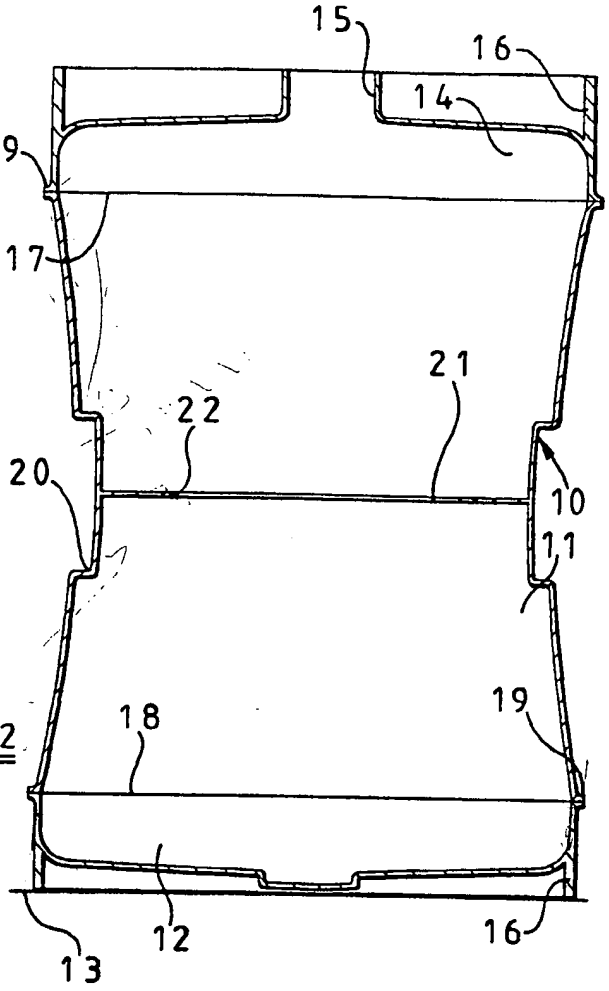


FIG 2

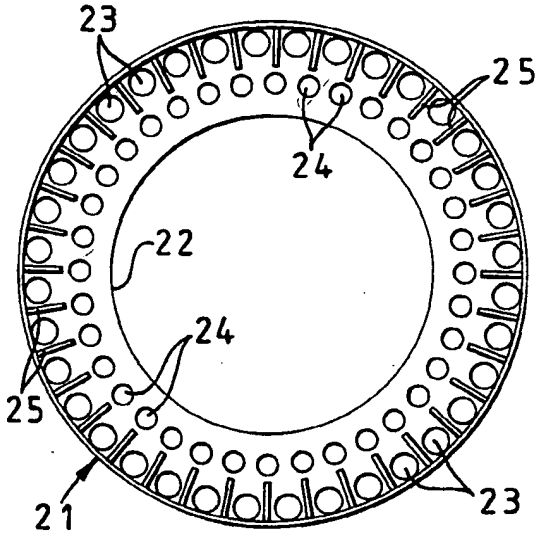


FIG 3

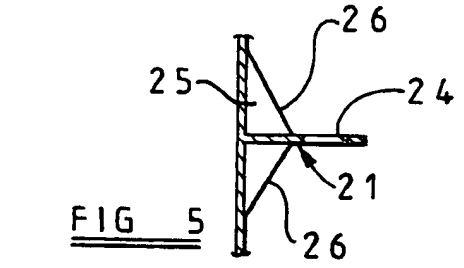


FIG 5

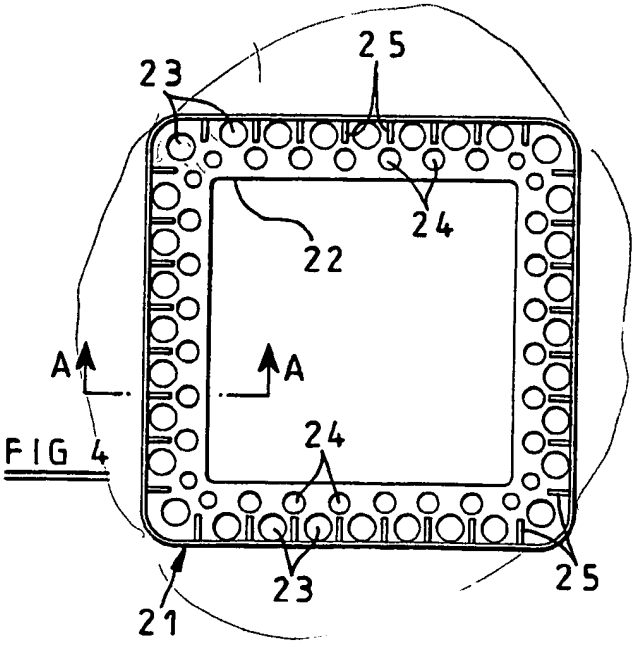


FIG 4

INTERNATIONAL SEARCH REPORT

Interm al Application No
PCT/GB 95/00890

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D8/22 B65D8/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,B,11 23 250 (WEISE) 1 February 1962	1,2,4,5, 7,8, 11-17 18,19
A	see the whole document	
A	GB,A,1 139 816 (KENNEDY) 15 January 1969	
A	DE,A,30 49 232 (SCHIEMANN) 29 July 1982	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 August 1995	04. 08. 95

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016	SERRANO GALARRAGA, J

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Intern. al Application No
PCT/GB 95/00890

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-B-1123250		NONE	
GB-A-1139816		NONE	
DE-A-3049232	29-07-82	US-A- 4399850	23-08-83